7-6: n^{th} Roots (The music lesson)

What is the opposite of exponentiation?

Warm-up: Solve each.

1. $x^2 = 144$
2. $x^3 = 8$
3. $x^4 = 81$
4. $x^3 = 64$
5. $x^2 = \frac{25}{64}$
6. $x^3 = \frac{1}{27}$

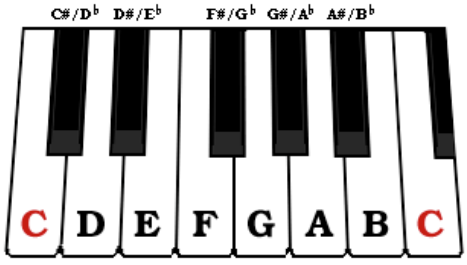
n^{th} roots:

Example 1:

a. Estimate the real 12^{th} root of 2 (This is the constant ratio for a piano).

So, for a piano, $r \approx$

b. Find the frequency of the F above the A with frequency 220 hertz.



http://www.smu.edu/totw/keybrd2.gif

$\frac{1}{n}^{th}$ *Exponent Theorem:*

Example 2: Evaluate.

a. $27^{\frac{1}{3}}$ b. $25^{\frac{1}{2}}$ c. $\left(\frac{16}{625}\right)^{\frac{1}{4}}$ d. $115^{\frac{1}{3}}$

Number of Real Roots Theorem:

Example 3: Show that $1 - i$ is a fourth root of -4.

Example 4: Between which two consecutive integers is the real solution to $x^5 = 500$? Do not use a calculator.

Homework:

"If I have ever made any valuable discoveries, it has been owing more to patient attention, than to any other talent." - Isaac Newton